A.R.C. Cabinet Users' Meeting

Glasshouse Crops Research Institute, October 22nd, 1969

The following were represented: Belfast, G.C.R.I., Imperial College, Letcombe laboratory, Long Ashton, N.I.A.E., N.V.R.S., Reading, Rothamsted, Sutton Bonington, W.R.O.

(These notes include information discussed at the meeting, together with supplementary details obtained since).

1) General **It was noted that Saxton's had gone out of business and although the firm taking over had promised to complete the remaining cabinets of the second contract, it seemed unlikely that they would actively engage in further work in cabinets or maintain a full range of spares. The group working on cabinets at the N.I.A.E. had been deployed elsewhere, and since they would no longer be able to keep themselves up to date with future developments in cabinet engineering.**

2) Spares **In view of the change at Saxton's and N.I.A.E. it was agreed that the lists of current spares was very helpful. Spares stock lists from G.C.R.I. (Mr. Randall or Dr. Hurd), Reading (Mr. Dickinson or Dr. Hughes) and Rothamsted (Dr. Dart or Dr. Thorne) are enclosed. Another valuable feature was sharing information on replacement parts which were either cheaper than the ones already fitted or equivalents when standard items became obsolete. A dearer, readily available but non-illuminated replacement for the "lumitop" relay was available from "Omrea" (8 pin Mark 2P, 30/9, 11 pin Mark 3P, 37/3) or Radiospares (8 pin Type 5A, 27/6 11 pin Type 33A, 32/-)**

3) Light sources **Recently Mr. Hillman and Dr. Siegelman at Brookhaven had circulated a questionnaire on high intensity light sources for growth rooms and cabinets. Subsequent enquiry indicated that the only comment so far was that - "The best plant growth obtained thus far in a high light intensity growth chamber utilizes equal wattages of tungsten and fluorescent lamps". They promised to keep Reading informed of further developments. There appeared to be much uncertainty concerning both higher output lamps and dimming systems. The discussion first centred around the cabinets and rooms imported by R. W. Gunson Ltd. from Controlled Environments Ltd. of Canada, in which higher output lamps had the "Darco" dimming system were used. It seems that there is a range of higher output lamps with different temperature optima and furthermore there is less effect of temperature above and below the optimum for these lamps. Dr. Hurd reported that Troughton and Young Ltd., Wansdowne Place, Fulham Road, London SW 6 (01-385 9381) imported from**

Westinghouse, Canada. Tubes are only available in 4, 6, or 8 ft. lengths. The HG lamps are only marginally better than our standard lamp, but the SHO lamp at the same spacing as in the Saxcil cabinet would give 5,000 f.c. The fall off in intensity is about 4% per 1,000 hrs. similar to our present tubes. Lamps are wired in pairs, costing £x.xx for two 6 ft. lamps and £13.1o for the ballast. If the 6 ft. lamps could be accommodated in a cabinet 19 tubes would cost about the same as the present 56 tubes and be equal in light output.

A dimming system for fluorescent lamps is also available from Transter of Newcastle at a cost of £33 basic plus £2.23 per tube. There is the additional cost of altering the wiring to the fluorescent tubes.

Sources other than fluorescent lamps were discussed. It was reported that Dr Gaasum favoured a new high pressure sodium vapour lamp which had more light per watt and a good spectrum or growth. 400 watt units cost about £36. Dr.Clarkson (Letcombe) had been comparing fluorescent and HPRG lamps and found little difference at the same illumination levels. A dimmer for the HPRG lamps was available at about £20 for several lamps (Mr. Bedwell, Letcombe).

The nomenclature of lamps was confusing. The high pressure sodium vapour lamp is called HPSV by Philips in Holland = SON or SON/T by Philips in England. The SON is bulbous and the SON/T tubular. Mercury halide lamps are called MBI in England and HPI in Holland. Lamps called HO in Holland are equivalent to the old mercury vapour HA (obsolescent) or MB. Tungsten halogen lamps have a much greater intensity and a relatively greater red/far-red ratio than ordinary tungsten, but generally have all the problems of heat dissipation and abnormal growth found with conventional tungsten lamps.

A study of some different lamp sources has been made by A. N. Burdett at the Electricity Council Res. Centre at Capenhurst (ref. ECRC/R125).

Several people had had difficulty in obtaining HLRG lamps which were a special line made by Philips in Holland for horticultural use. When ordering it should be pointed out that ii is a special as it is not listed in the ordinary catalogue.

It was unanimously felt that information on new lamps was unreasonably hard to come by. Philips are reputed to circulate details of their current and experimental lamps from time to time. Users are asked to keep a look out for any new sources of information. (Mr. Canham helped sort out the situation described above which summarises all the information available to him).

The red/far-red balance of lamp combination was discussed at considerable length. Philips 27 and 55 had the highest far-red component. Agropyron, Chrysanthemum and Turnips had been successfully grown with fluorescent lamps alone, but the following abnormalities were considered to be due to too low a far-red component : Strawberry (excessive petiole length, Guttridge), barley (no flowering in long, Thorne}, barley (seedling chlorosis, Clarkson). Chenopodium and onion (no flowering in long days), lettuce hypocotyls elongation). It was suggested that some of these responses could be used to check the red/far-red ratio.

The proportion of tungsten used varied considerably between users depending largely no doubt on their experimental material: Sutton Bonington and Reading, none; N,V,R,S,, 3%; Letcombe, 7%; Rothamsted, 12%; G.C.R.I., 20%. Rough surface 25 watt pygmy lamps, small bayonet fitting, were found to have a good life. Letcombe under run their lamps at about 200 v to obtain a higher far-red component. To obtain the same red/far-red ratio in a cabinet as daylight would require 6,000 watts tungsten at 240 volts (i.e. almost twice the fluorescent total).

The ISCO spectroradiometer was suitable for measuring spectral energy distributions. There were such instruments at Belfast, Imperial College and Oxford. (The faults in the Reading instrument were still not yet rectified). For a simple comparison of light above and below 695 or 630 nm, it is now possible to obtain a Schott R695 or R630 dome to fit over a Kipp at approximately £36 each. Details from Mr. G. Szeicz, Rothamsted.

Dr. Guttridge reported that strawberry plants became prematurely senescent in high light intensities, but not in low. No explanation or similar experience was forthcoming.

4) <u>Space Allocation</u> Rothamsted had a committee for deciding how cabinets and growth rooms were to be allocated. The committee had a non-user as Chairman, the other members all being potential users. A maximum of one year could be booked at a time. At Wellesbourne, the cabinets were only occasionally used by people other than Mr. Austin and Mr. Hardwlck. At Nottingham, there was not excessive demand and ad hoc arrangements sufficed. In general users other than physiologists were often merely looking for a bank of lights and rough temperature control, so that their needs could often be satisfied by much less sophisticated equipment. There seemed now to be a relatively greater demand for "2nd" quality controlled environment space, both cabinets and rooms. Positive humidification was the only special feature frequently asked for, especially by those investigating pests and diseases. Two rooms each of 35 sq. ft. and each costing £1,500 had recently been installed at Letconbe by Prestcold. Fisons (Cabinets) and Controlled Environments Ltd. (U.K. Agent R. G. Gunson Ltd., 20 St. Dunstan's Hill,

London E.C.3., rooms and cabinets) offered equipment marginally cheaper than Saxcil cabinets.

5) Wind speed measurement The difficulties of making sensible measurements of wind speed were emphasized by G.C.R.I. The hot wire (Tinsley), thermistor (Radons, West Worthing, c £120) or vane (Air Flow developments, High Wycombe, c £80) anemometers were all at the lower limit of their range. For the first two it was difficult to distinguish turbulence from linear flow. In the third, slight turbulence depressed the reading.

6) Next meeting It was felt that a meeting in a year's time along the usual lines would be useful, particularly as there was no group now permanently devoted to cabinets. The next meeting has been provisionally fixed for October, 1970 at Hurley. Although the discussions often range beyond immediate relevance to Saxcil cabinets, it was felt desirable to restrict regular participation to the present group as larger meeting could not be hold on the same informal lines.

7) Demonstrations The afternoon was spent inspecting the cabinets and ancillary equipment at the G.C.R.I. CO_2 injection for cabinets controlled by conductivity CO_2 analysers (Brennig James type) and monitored by IRGA; conductivity CO_2 analyser for field use (Begg and Lake type); a model prototype daylit cabinet; bender and welder for P.V.C. sheet; a simple constant water head device; thermistor clip for leaf temperature measurement, and an automatic deioniser/steriliser.

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